Final
Technical Support Document for
HWC MACT Standards

HWC Emissions Database
Volume II
Main Report

Office of Solid Waste and Emergency Response (5305)
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ABSTRACT

The final version of the U.S. Environmental Protection Agency's (EPA) hazardous waste combustor (HWC) emissions database is presented. The HWC emissions database is the basis for the determination of the Maximum Achievable Control Technology (MACT) standards and contains a summary of the emissions information on toxic metals, PM, HCl, Cl_2, HC, CO, PCDD/PCDF, and semi-volatile and volatile organic compounds from hazardous waste burning cement kilns, lightweight aggregate kilns, and incinerators. Other information in the HWC emissions database includes data on facilities, operating parameters, and fuel and raw material feeds. The U.S. EPA will make available to the public the HWC emissions database in Paradox 7.0 for Windows format.

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LIST OF ACRONYMS AND ABBREVIATIONS

Acronym/ Abbreviation	Description
?	Not Available
4D	Tetrachlorodibenzo-(p)-dioxin
4F	Tetrachlorodibenzofuran
5D	Pentachlorodibenzo-(p)-dioxin
5F	Pentachlorodibenzofuran
6D	Hexachlorodibenzo-(p)-dioxin
6F	Hexachlorodibenzofuran
7D	Heptachlorodibenzo-(p)-dioxin
7F	Heptachlorodibenzofuran
8D	Octachlorodibenzo-(p)-dioxin
8F	Octachlorodibenzofuran
AB	Afterburner
ACS	Acid Scrubber
APC	Air Pollution Control
APCD	Air Pollution Control Device
AS	Absorber
AT	Ash Trap
AVE	Average
BL	Baseline
C	Cyclone
CA	Carbon Absorber
CAA	Clean Air Act
CAP	Capacity
CARNOT	Carnot Inc. test teams performed measurements
CCS	Counter Current Scrubber
CK	Cement Kiln
CL	Chlorine
CO	Carbon Monoxide
CoC	Certification of Compliance
COMB	Combustion

LIST OF ACRONYMS AND ABBREVIATIONS (CONTINUED)

Acronym/ Abbreviation	Description
COND	condition
CS	Caustic Scrubber
cSt	centi-Stoke (unit of viscosity)
CT	Chimney Tray
DA	Dilution Air
DF	Dioxin/Furan
DI	Dry Injection
DM	Demister
dscfm	Dry standard cubic feet per minute
dscm	dry standard cubic meter
EER	Energy and Environmental Research Corporation
EP	Emitting Process
EPA	Environmental Protection Agency
ES	Entrainment Separator
ESP	Electric Static Precipitator
F	Fahrenheit
FF	Fabric Filter
FN	Fog Nozzle
GC	Gas Cooler
gr/dscf	grains per dry standard cubic feet
HAP	Hazardous air pollutant
HCl	hydrogen chloride
HCS	Hydrogen Chloride Scrubber
HE	Heat Exchanger
HEPA	High Efficiency Particulate Air Filter
HES	High Energy Scrubber
Hex	hexavalent
HP	HEPA Filter
HS	Hydrogen Chloride Scrubber
HTHE	High Temperature Heat Exchanger
HC	Hydrocarbons
HW	Hazardous waste
HWC	Hazardous waste combustor

LIST OF ACRONYMS AND ABBREVIATIONS (CONTINUED)

Acronym/ Abbreviation	Description
HWI	Hazardous waste incinerator
ID	Identification
INC	Incinerator
Inch H20	Inches of water
IWS	Ionizing Wet Scrubber
KOV	Knock Out Vessel
KVA	Kilovolt ampere
LIQ	liquid
LTHE	Low Temperature Heat Exchanger
LVM	Low-volatile metal/s
LWAK	Light Weight Aggregate Kiln
MACT	Maximum Achievable Control Technology
MAX	Maximum
MC	Multiple Cyclone
Mds	Modifications
MIN	Minimum
MW	Mixed Waste
N	No
NA	Not Applicable
ND	Non-detect
ng	nanogram
NO.	Number
NODA	Notice of Data Availability
PBC	Packed Bed Condenser
PBS	Packed Bed Scrubber
PCDD/PCDF	Polychlorinated Dioxin/Furans
PM	Particulate Matter
ppmv	parts per million by volume
ppmvd	parts per million by volume dry
PRESS	Pressure
PROD	production
PT	Packed Tower
Q	Quencher

LIST OF ACRONYMS AND ABBREVIATIONS (CONTINUED)

Acronym/ Abbreviation	Description
QC	Quench Column
QS	Quench Separator
QT	Quench Tower
RJS	Reverse Jet Scrubber
S	Scrubber
SD	Spray Dryer
SLD	solid
SVM	Semi-volatile metal/s
SS	Spray Saturator
SVOC	Semi-volatile organic compound
SYS	System
TCl	Total chlorine/chlorides
TEMP	Temperature
TEQ	Toxic Equivalency
THC	Total hydrocarbons
Total PCDD	Total Polychloronated dibenzo-(p)-dioxin
Total PCDF	Total Polychloronated dibenzofuran
TPH	tons per hour
tpy	tons per year
ug	microgram
U.S.	United States
VOC	Volatile organic compound
VQ	Venturi Quench
VS	Venturi Scrubber
WHB	Waste Heat Boiler
WS	Wet Scrubber
Y	Yes

CHAPTER 1

INTRODUCTION

The U.S. Environmental Protection Agency (EPA) is setting "Maximum Achievable Control Technology" (MACT) standards for hazardous waste combustors (HWCs): hazardous waste incinerators (HWIs), hazardous waste burning cement kilns (CKs), and hazardous waste burning lightweight aggregate kilns (LWAKs). The MACT emission standards are being developed under Title III of the 1990 Clean Air Act Amendments (CAA). MACT emissions standards are established for the following hazardous air pollutants (HAPs) from HWCs: polychlorinated dioxins and furans (PCDD/PCDF); mercury (Hg); semivolatile metals (SVM) which include cadmium (Cd) and lead (Pb); low volatile metals (LVM) which include arsenic (As), beryllium (Be), and chromium (Cr); hydrogen chloride (HCl) and chlorine gas (Cl_2) as total chlorine (TCl); particulate matter (PM) as a surrogate for the HAP metals of cobalt (Co), manganese (Mn), nickel (Ni), selenium (Se), and antimony (Sb); and carbon monoxide (CO) and hydrocarbons (HC) as surrogates for non-PCDD/PCDF organic HAPs.

This document provides documentation of the HWC emissions database which is the basis of the determination of the MACT standards. It contains a summary of the HWC emissions information on toxic metals, PM, HCl and Cl_2, HC, CO, semi-volatile and volatile organic compounds, and PCDD/PCDF. Other detailed information encompassed in the data summary includes company name and location, emitting process information, combustor design and operation information, air pollution control device (APCD) design and operation information, stack conditions during testing, feed rates, and emission rates of HAPs by test condition. This is the second in a series of five volumes of technical background documents that support the final rule. The other four volumes are:

- *Technical Support Document for HWC MACT Standards, Volume I: Description of Source Categories*, which contains process descriptions of each of the hazardous waste combustor source categories (incinerators, cement and lightweight aggregate kilns). Also included are discussions on air pollution control device design, operation, and

performance characteristics of current systems, as well as state-of-the-art techniques that are applicable.

- *Technical Support Document for HWC MACT Standards, Volume III: Selection of MACT Standards and Technologies,* which discusses the approach and identifies the MACT Floors for each HAP and source category for existing sources and new sources.

- *Technical Support Document for HWC MACT Standards, Volume IV: Compliance with the HWC MACT Standards,* which contains discussions of continuous emissions monitors and operating parameter limit compliance requirements for the final rule.

- *Technical Support Document for HWC MACT Standards, Volume V: Engineering Costs,* which contains cost estimates and emissions reductions associated with the HWC MACT standards.

The emission standards have been developed through the MACT approach defined in Title 3 of the 1990 Clean Air Act Amendments (CAAA). In this approach the MACT floor standard for existing facilities is established at the level of the average performance of the best 12% of existing sources. Depending on the additional benefits and costs, EPA may elect to set more stringent, but technically achievable, BTF standards for specific HAPs. In the final rule, BTF standards have been set for PCDD/PCDF for incinerators with waste heat boilers, for SVM for CKs and LWAKs, and for total chlorine for LWAKs.

The floor and BTF standards have been selected based on the database (described in this document) of trial burn and compliance test emissions measurements from 105 incinerators, 31 cement kilns, and 16 lightweight aggregate kilns[1] using a process described in detail in *Technical Support Document for HWC MACT Standards, Volume III: Selection of MACT Standards and Technologies*. The database contains information from an additional 17 incinerators, 12 cement kilns, and 1 lightweight aggregate kiln which are no longer burning hazardous waste; however, data from these facilities were not used in setting the floor or BTF standards.

This work builds off the Agency's previous proposals, including the HWC MACT Proposed Rule and various Notice of Data Availability (NODA), and considers stakeholder comments on the database used in these proposals.

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[1]Note that some of these LWAKs share air pollution control equipment and are operated intermittently. The cost and emissions estimates described in Volume V have been developed only for the 10 LWAKs which can operate simultaneously.

CHAPTER 2

HWC EMISSION DATABASE DEVELOPMENT HISTORY

The EPA compiled a database containing the results of HWC trial burns and facility operating and design characteristics as part of the development of the April 1996 proposed MACT standards for HWCs (61 FR 17358 (April 19, 1996)). As mentioned in the Introduction chapter, the database contains information from hazardous waste facilities in three source categories: incinerators, cement kilns, and lightweight aggregate kilns. Data on boilers and industrial furnaces also are included in the database even though hazardous waste burning boilers and industrial furnaces are not subject to the new MACT rule. The database contains stack gas emissions data including data on the following:

- metals, chlorine, PM, PCDD/PCDF, CO, HC, VOCs, and SVOCs
- process operating data (including waste, fuel, and raw material compositions and feed rates)
- facility and equipment design
- operational data (including combustor and APCD temperatures, pressures, etc.)

Since the proposal of the rule, the database has undergone several revisions. The original database was developed in support of the proposed revised standards for hazardous waste combustors. Revisions were made to the database following a public and stakeholder comment period wherein discrepancies were noted in the database and new trial burn and Certificate of Compliance (CoC) test reports were submitted. This second version was released for public comment as part of a NODA (62 FR 960, (January 7, 1997)). Further revisions based on comments received were incorporated following this comment period, which again included additional data submittals. This third version of the database was used as a basis for the reevaluation of the MACT standards, and released as part of a NODA (62 FR 24211 (May 2, 1997)). The database has since been updated based on additional NODA comments and trial

burn reports obtained through further data collection efforts. (It is noted that any updates made to the database since the May 2, 1997 NODA have not undergone public comment.) The resulting fourth version of the database was used for the final rule MACT analysis and is presented in this document.

CHAPTER 3

DATABASE CONTENTS AND DESCRIPTION

3.1 DATABASE SUMMARY REPORTS

The information in the database is provided in the following three appendices:

Appendix A: Cement Kilns
Appendix B: Lightweight Aggregate Kilns
Appendix C: Incinerators (in 2 parts: Sections 1-6 and Sections 7-8)

Each of the data summary reports is divided into eight sections. Each section provides a particular type of information. The information within each section is grouped by the specified device tested. The information provided in each section is described below:

Section 1: Company and Test Location Summary. This section includes the name and location of each emitting process in the database. The emitting processes are sorted by 1. Company, 2. City, 3. State, and 4. Emitting Process (EP) ID. It should be noted that sort field 1 is printed only when it changes. Sort fields 2, 3, and 4 are printed for every record.

Section 2: Emitting Process Summary Information and Test Conditions. This section includes basic information of each emitting process such as the types of waste and fuel burned, the type of air pollution control (APC) system, the capacity, and whether the facility is an area source. For purposes of this document, an area source is a facility that would have facility-wide emissions of HAPs that would not exceed 10 tpy for any single HAP or 25 tpy of HAPs in aggregate if emissions were uncontrolled (i.e., the facility is a low emitter of HAPs either because of inherent characteristics of the process or it is a small facility). HAPs are listed in Section 112(b) of the Clean Air Act (CAA), as amended. Note that the term area source has a different meaning under Section 112(a). Because of the uncertainty in classifying area and major sources, the database area source field indicates "No" for all of the records. However,

determination of area/major sources is addressed in more detail in the *Final Technical Support Document HWC MACT Standards, Vol. V: Emission Estimates and Engineering Costs.*

This section also includes information on the facilities' current hazardous waste burning activities. If the emitting process is a cement kiln, specifics on system configuration like kiln type, alkali bypasses, and heated in-line raw mills are also included. If a test was conducted under permit setting conditions, an "x" was entered in the column for the pollutant for which limits are being established. If all pollutants of concern were sampled under permit setting conditions, a "Y" was entered under the column labeled "All". If a column is blank, the pollutant was either not sampled during that condition or sampled under "normal" operating conditions. All of this information is listed in the report under the heading "Normal Emissions Information". The report also lists a baseline column labeled "BL" and a modifications column labeled "Mds". If the test was conducted under baseline conditions, a "Y" was entered under the "BL" column. Similarly, if the emitting process has made modifications to the system and re-tested, the "Mds" column lists a "Y" for those conditions which represent the changes. Finally, besides Run IDs, the report contains the condition date, the fuel and waste burned, and a brief description of each test conducted on the emitting process. The information is sorted by 1. Company, 2. State, 3. City, 4. EP ID, and EP Run ID. The EP Run ID includes the emitting process ID, condition number, and run number. It should be noted that the sorted fields 1, 2, and 3 are printed only when they can change. Sort fields 4 and 5 are printed for every record.

Section 3: Kiln/Incinerator Design and Operating Information. This section includes detailed chamber specific information on the combustor design and operation for each emitting process. The information is sorted by 1. Company, 2. State, 3. City, 4. EP ID, 5. Combustor Type, and 6. EP Run ID. It should be noted that the sort fields 1, 2, 3, 4, and 5 are printed only when they can change. Sort field 6 is printed for every record.

Section 4: Air Pollution Control Device (APCD) Design and Operating Information. This section includes detailed APCD specific information on APCD design and operation for each emitting process. The information is sorted by 1. Company, 2. State, 3. City, 4. EP ID, 5. APC System Type, and 6. EP Run ID. It should be noted that the sort fields 1, 2, 3, 4, and 5 are printed only when they can change. Sort field 6 is printed for every record. Section 4 is divided into several subsections including:

4a - Electrostatic Precipitator Design and Operating Information
4b - Fabric Filter Design and Operating Information
4c - Quench Design and Operating Information
4d - Venturi Scrubber Design and Operating Information

4e - Scrubber Design and Operating Information
4f - Other Control Design and Operating Information

Sections 4a, 4b, and 4f apply to CKs, sections 4b-4d and 4f apply to LWAKs, and Sections 4a-4f apply to INCs.

Section 5: Emission Stream Rates. This section includes basic source test information at the controlled and uncontrolled air emission sampling locations. The information is sorted by 1. Company, 2. State, 3. City, 4. EP ID, 5. Stream Type (Controlled and Uncontrolled), 6. Stream Description (Emissions), and 7. EP Run ID. It should be noted that sort fields 5 and 6 are printed only when they can change. Sort fields 1, 2, 3, and 4 are listed at the top of each page. Sort field 7 is printed for every record.

Section 6: Other Stream Rates. This section includes basic information for each process stream where available. Example process streams include spikes, waste, fuel, raw materials, collected ash, and product. The information is sorted by 1. Company, 2. State, 3. City, 4. EP ID, 5. Stream Type (Fuel, Waste, Raw Material, Spike, Fabric Filter Ash, Clinker, Aggregate, Electrostatic Precipitator Ash, etc.), and 7. EP Run ID. It should be noted that sort fields 5 and 6 are printed only when they can change. Sort fields 1, 2, 3, and 4 are listed at the top of each page. Sort field 7 is printed for every record.

Section 7: Emissions Analyses. This section includes trace metals (Arsenic, Antimony, Barium, Beryllium, Cadmium, Chromium, Lead, Nickel, Mercury, Selenium, Silver, and Thallium), particulate, HCl/Cl_2, total hydrocarbons (THC), CO, semi-volatile organic compounds (SVOC), volatile organic compounds (VOC), and dioxin/furan analyses for controlled and uncontrolled air emissions. A zero indicates that no data were available. Units include lbs/hr for all mass flow rates. Concentration units depend on the stream type and substance category. Concentrations are provided in ppmv for HCl/Cl_2/CO/THC, µg/dscm for metals, gr/dscf for particulate, and ng/dscm for SVOC, VOC, and dioxin/furans. Where possible, the air emission concentrations have been corrected to 7% oxygen. In some cases, the oxygen content of the stack gases was not provided. The information is sorted by 1. Company, 2. State, 3. City, 4. EP ID, and 5. Stream Type (Controlled or Uncontrolled), 6. Stream Description (Emissions), 7. Category (Chlorine, Dioxin & Furan, Metals, Particulate, SVOC, THC & CO, and VOC), 8. Substance (various), and 9. EP Run ID. It should be noted that sort fields 5, 6, and 7 are printed only when they can change. Sort fields 1, 2, 3, and 4 are listed at the top of each page. Sort fields 8 and 9 are printed for every record.

Section 8: Other Stream Analyses. This section includes trace metals (Arsenic, Antimony, Barium, Beryllium, Cadmium, Chromium, Lead, Nickel, Mercury, Selenium, Silver, and Thallium), particulate, HCl/Cl_2, SVOC, VOC, and dioxin/furan analyses for process streams. A zero indicates that no data were available. Units include lbs/hr for all mass flow rates. Concentration units for most substances are μg/g. The information is sorted by . Company, 2. State, 3. City, 4. EP ID, 5. Stream Type (Fuel, Waste, Raw Material, Spike, Fabric Filter Ash, Clinker, Aggregate, and Electrostatic Precipitator Ash), 6. Stream Description (various), 7. Category (Chlorine, Dioxin & Furan, Metals, Particulate, SVOC, THC & CO, and VOC), 8. Substances (various), and 9. EP Run ID. It should be noted that sort fields 5, 6, and 7 are printed only when they can change. Sort fields 1, 2, 3, and 4 are listed at the top of each page. Sort fields 8 and 9 are printed for every record.

At the end of this section are Table 3-1 and Figure 3-1. Table 3-1 describes each field and all of the terms used in the database (provides a comprehensive "Data Element Dictionary"). Figure 3-1 provides a diagram of the organization and structure of the HWC database.

Note that to help the reader navigate through the data summary reports (appendices A,B, and C), the Table of Contents of each Data Summary Report provides a list of relevant information for each emitting process. The Table of Contents is divided into two parts: Part 1 can be used to quickly locate all information for a particular emitting process while Part 2 can be used to locate emitting processes within a section. An emitting process is a collection of combustion devices which emit to a common stack or collection of stacks. For example, a facility may have two devices whose emissions are combined and exhausted through a common stack. This would be classified as a single emitting process. However, if each device had its own stack, each device would be considered as a separate emitting process. Each appendix also contains a list of acronyms and abbreviations and a table containing data field summary descriptions and examples.

3.2 PARADOX VERSION OF DATABASE

In addition to being posted on EPA's Cleanup Information Bulletin Board System (CLU-IN), the EPA will make available to the public the HWC emission database in Paradox 7.0 for Windows format. The database includes nine related files as shown in Figure 3-1.

The data files, file structure, and file contents are identical to that of the data summary reports. Also, the "data element descriptions" in the previous section are also applicable to the Paradox database.

TABLE 3-1. DATA SUMMARY FIELD DESCRIPTIONS AND EXAMPLES

Field Name*	Description	Example Inputs
Section 1. Company and Test Location Summary		
1. Company	Company	
2. City	City	
3. State	State	
EPA ID	EPA Identification Number	
Region	EPA Region	
4. EP ID	Emitting process ID number. 3 digit number used by EER. An emitting process is a collection of combustion devices that emit to a common stack or collection of stacks	101, etc.
Device Name	Name given to emitting process by plant	
Section 2. Emitting Process Summary Information and Test Conditions		
1. Company	Company	
2. State	State	
3. City	City	
EPA ID	EPA Identification Number	
Region	EPA Region	
Emitting Process Information:		
4. EP ID	Emitting process ID number. 3 digit number used by EER.	101, etc.
Device Name	Name given to emitting process by plant	Kiln #1, Unit #2, etc.
# of Devices	Number of devices in emitting process	
System Type	Basic type of device	Cement Kiln
APC System	All types of APCD in emitting process	ESP/FF/VS, QC, MC
Waste Type Summary	All types of waste burned in emitting process	HW Sld/Liq, HW Sludge
Fuel Type Summary	All types of fuel burned in emitting process	Coal, Coke, Natural Gas, none
Capacity	Maximum capacity of emitting process (clinker capacity if available, or raw material feed.)	36 tph clinker, 65 tph raw feed
Currently Burning HW	Indicates whether facility is currently burning hazardous waste	Yes or No
Currently Burning MW	Indicates whether facility is currently burning mixed waste	Yes or No

*Numbers represent sort order for data summary.

TABLE 3-1. DATA SUMMARY FIELD DESCRIPTIONS AND EXAMPLES

Field Name*	Description	Example Inputs
Kiln Type	For cement kilns only indicates kiln length	Long or Short
Alkali Bypass	For cement kilns only indicates whether system has a bypass	Yes or No
Inline RawMill	For CKs only indicates whether system has a heated inline rawmill	Yes or No
Area Source	Indicates whether facility is an area source	Yes or No
Condition Information:		
5. EER Run ID	Identification # for run. Consists of EP ID #/Condition #/Run #	101C1R1, 101C1R2, etc.
Site Run ID	Site description of run	Condition A, Runs 1-4
Cond Date	Condition Date	1/1/96
Fuel	Fuel burned during given condition	Coal, Coke, Natural Gas, none
Waste	Waste burned during given condition	HW Sld/Liq, HW Sludge
Description	Condition description	Low comb temp/low HW waste feed, High comb temp/high Cl feed, etc.
BL	Baseline	Y for Yes; N or No
Mds	Modifications	Y for Yes; N or No
Normal Emissions Information:		
All	Were all substances sampled under normal conditions?	Y for Yes; N or No
Cl	Was Chlorine sampled under operating limit setting conditions?	x for Yes
Sb	Was Antimony sampled under operating limit setting conditions?	x for Yes
As	Was Arsenic sampled under operating limit setting conditions?	x for Yes
Ba	Was Barium sampled under operating limit setting conditions?	x for Yes
Be	Was Beryllium sampled under operating limit setting conditions?	x for Yes
Cd	Was Cadmium sampled under operating limit setting conditions?	x for Yes
Cr	Was Chromium sampled under operating limit setting conditions?	x for Yes
Pb	Was Lead sampled under operating limit setting conditions?	x for Yes
Hg	Was Mercury sampled under operating limit setting conditions?	x for Yes
Ni	Was Nickel sampled under operating limit setting conditions?	x for Yes
Se	Was Selenium sampled under operating limit setting conditions?	x for Yes
Ag	Was Silver sampled under operating limit setting conditions?	x for Yes
Tl	Was Thallium sampled under operating limit setting conditions?	x for Yes
DF	Was Dioxin/Furan sampled under operating limit setting conditions?	x for Yes

*Numbers represent sort order for data summary.

Field Name*	Description	Example Inputs
PM	Was PM sampled under operating limit setting conditions?	x for Yes
CO	Was CO/THC sampled under operating limit setting conditions?	x for Yes
Section 3. Kiln/Incinerator Process Design and Operating Information.		
1. Company	Company	
2. State	State	
3. City	City	
EPA ID	EPA Identification Number	
Region	EPA Region	
4. EP ID	Emitting process ID number. 3 digit number used by EER.	101, etc.
Device Name	Name given to emitting process by plant	Kiln #1, Unit #2, etc.
System Type	Type of System	Cement Kiln
APC System	All types of APCD in emitting process	ESP/FF/VS, QC, MC
5. Combustor Type	Type of combustor described in this sub-section	Wet Kiln or Dry Kiln
Chamber Specific Design Info.:		
Chamber Name	Name given to chamber by site	Kiln, Afterburner
Chamber Type	Type of chamber	Single, Primary, Secondary, etc.
# of Devices	Number of similar devices in EP	
Length (ft)	Length of chamber (feet)	
Manufacturer	Manufacturer of device	
Surface Area (ft2)	Interior surface area of combustion chamber (sq. feet)	
Diameter (ft)	Inside diameter of chamber (feet)	
Refractory Type	Type of refractory	Brick, etc.
Length to Diameter	Ratio of length to diameter	
Burner Type	Type of burner	Low NOx, Conventional, etc.
Volume (ft3)	Interior volume of chamber (cubic feet)	
Precalciner	Indicates presence of precalciner	Y, N
Bypass	Indicates presence of bypass	Y, N
Preheater	Indicates presence of preheater	Y, N
Dust Recycle	Indicates whether captured particulate is recycled back to kiln	Y, N

*Numbers represent sort order for data summary.

Field Name*	Description	Example Inputs
Comment	Any additional comments regarding combustor description	
Chamber Specific Operating Info.:		
6. Run ID	Identification # for run. Consists of EP ID #/Condition #/Run #	101C1R1, 101C1R2, etc.
Measurement Location	Measurement location of temp and O2 within comb. chamber	High end, low end, etc.
Ave Temp (F)	Average temperature at measured location	
Oxygen (%)	Oxygen concentration at measured location	
Section 4a. Electrostatic Precipitator Design and Operating Information.		
1. Company	Company	
2. State	State	
3. City	City	
EPA ID	EPA Identification Number	
Region	EPA Region	
4. EP ID	Emitting process ID number. 3 digit number used by EER.	101, etc.
Device Name	Name given to emitting process by plant	Kiln #1, Unit #2, etc.
System Type	Type of System	Cement Kiln
APC System	All types of APCD in emitting process	ESP/FF/VS, QC, MC
5. APC Device Type	Type of APCD described in this sub-section	ESP
Design Information:		
Controls emissions from	Describes which device precedes this APCD	Wet Kiln, Dry Kiln, WS, etc.
Location	Location of current APCD within total APCD train	1, 2, 3, 4, 5
# of Devices	Number of similar APCDs in EP	
Manufacturer	APCD Manufacturer	
Configuration	Basic configuration of ESP	Wet or Dry
Plate Area (ft2)	Plate area in feet squared	
Rapping Mechanism	Type of rapping mechanism	Mechanical, Vibrators, etc.
Number of Fields	Number of fields	
Rapping Frequency (cpm)	Rapping frequency in cycles per minute	
Controller	Type of controller	Automatic, etc.

*Numbers represent sort order for data summary.

TABLE 3-1. DATA SUMMARY FIELD DESCRIPTIONS AND EXAMPLES

Field Name*	Description	Example Inputs
SCA (ft2/kacfm)	Specific collection area in feet squared per thousand actual cubic feet per minute	
Wire to Plate (in)	Wire to plate distance in inches	
Resistivity (Ohm-cm)	Resistivity in ohm-cm	
Electrode Spec.	Electrode specification	Wire, Barbed Tube, etc.
Gas Conditioning	Gas conditioning	Water, None, etc.
Comment	Any additional comments regarding APCD description	
Operating Information:		
6. Run ID	Identification # for run. Consists of EP ID #/Condition #/Run #	101C1R1, 101C1R2, etc.
Temp (F)	Average temperature at APCD	
SCA (ft2/kacfm)	Specific collection area in feet squared per thousand actual cubic feet per minute. At APCD temp.	
Power (KVA)	Power consumption of APCD in KVA	
Section 4b. Fabric Filter Design and Operating Information.		
1. Company	Company	
2. State	State	
3. City	City	
EPA ID	EPA Identification Number	
Region	EPA Region	
4. EP ID	Emitting process ID number. 3 digit number used by EER.	101, etc.
Device Name	Name given to emitting process by plant	Kiln #1, Unit #2, etc.
System Type	Type of System	Cement Kiln
APC System	All types of APCD in emitting process	ESP/FF/VS, QC, MC
5. APC Device Type	Type of APCD described in this sub-section	FF
Design Information:		
Controls emissions from	Describes which device precedes this APCD	Wet Kiln, Dry Kiln, WS, etc.
Location	Location of current APCD within total APCD train	1, 2, 3, 4, 5
# of Devices	Number of similar APCDs in EP	
Manufacturer	APCD Manufacturer	

*Numbers represent sort order for data summary.

Field Name*	Description	Example Inputs
Configuration	Basic configuration of FF	Pulse Jet, Reverse Flow, etc.
Number of Comparts	Number of compartments	
Cloth Area (ft2)	Cloth area in feet squared	
Number of Bags	Number of bags	
Induced	Induced	Induced or Pressurized
Fabric Type	Type of fabric	Fiberglass, Nomex, Teflon, etc.
Air to Cloth Ratio (ft/min)	Air to cloth ratio in feet per minute	
Maintenance Schedule	Frequency of cleaning	
Comment	Any additional comments regarding APCD description	
Operating Information:		
6. Run ID	Identification # for run. Consists of EP ID #/Condition #/Run #	101C1R1, 101C1R2, etc.
Temp (F)	Average temperature at APCD	
Pressure Drop (in. H2O)	Pressure drop across FF in inches of water	
Air to Cloth (ft/min)	Air t actual cubic feet per minute. At APCD temp.	
Section 4c. Quench Design and Operating Information.		
1. Company	Company	
2. State	State	
3. City	City	
EPA ID	EPA Identification Number	
Region	EPA Region	
4. EP ID	Emitting process ID number. 3 digit number used by EER.	101, etc.
Device Name	Name given to emitting process by plant	Kiln #1, Unit #2, etc.
System Type	Type of System	Onsite or Commercial Incinerator
APC System	All types of APCD in emitting process	ESP/FF/VS, QC, MC
5. APC Device Type	Type of APCD described in this sub-section	QT, WHB, QC, etc.
Design Information:		
Controls emissions from	Describes which device precedes this APCD	Controlled Air, ESP, etc.
Location	Location of current APCD within total APCD train	1, 2, 3, 4, 5
# of Devices	Number of similar APCDs in EP	

*Numbers represent sort order for data summary.

Field Name*	Description	Example Inputs
Manufacturer	APCD Manufacturer	
Configuration	Basic configuration of Quench	Horizontal, Indirect, etc.
Reagent	Type of reagent used if any	NaOH, Lime, etc.
Comment	Any additional comments regarding APCD description	
Operating Information:		
6. Run ID	Identification # for run. Consists of EP ID #/Condition #/Run #	101C1R1, 101C1R2, etc.
Temp (F)	Average temperature at APCD	
Pressure Drop (in. H2O)	Pressure drop across quench in inches of water	
Liquid to Gas (gal/kacf)	Liguid to gas ratio in gallons per thousand actual cubic feet	
PH	PH	
Reagent to Gas (lb/kacf)	Reagent to gas ratio in pounds per thousand cubic feed	
Section 4d. Venturi Scrubber Design and Operating Information.		
1. Company	Company	
2. State	State	
3. City	City	
EPA ID	EPA Identification Number	
Region	EPA Region	
4. EP ID	Emitting process ID number. 3 digit number used by EER.	101, etc.
Device Name	Name given to emitting process by plant	Kiln #1, Unit #2, etc.
System Type	Type of System	Cement Kiln
APC System	All types of APCD in emitting process	ESP/FF/VS, QC, MC
5. APC Device Type	Type of APCD described in this sub-section	VS
Design Information:		
Controls emissions from	Describes which device precedes this APCD	Wet Kiln, Dry Kiln, WS, etc.
Location	Location of current APCD within total APCD train	1, 2, 3, 4, 5
# of Devices	Number of similar APCDs in EP	
Manufacturer	APCD Manufacturer	

*Numbers represent sort order for data summary.

Field Name*	Description	Example Inputs
Configuration	Basic configuration of Venturi Scrubber	Fixed or Variable Throat
Reagent	Type of reagent used if any	NaOH, Lime, etc.
Comment	Any additional comments regarding APCD description	
Operating Information:		
6. Run ID	Identification # for run. Consists of EP ID #/Condition #/Run #	101C1R1, 101C1R2, etc.
Temp (F)	Average temperature at APCD	
Pressure Drop (in. H2O)	Pressure drop across venturi in inches of water	
Liquid to Gas (gal/kacf)	Liguid to gas ratio in gallons per thousand actual cubic feet	
PH	PH	
Reagent to Gas (lb/kacf)	Reagent to gas ratio in pounds per thousand cubic feed	
Section 4e. Scrubber Design and Operating Information.		
1. Company	Company	
2. State	State	
3. City	City	
EPA ID	EPA Identification Number	
Region	EPA Region	
4. EP ID	Emitting process ID number. 3 digit number used by EER.	101, etc.
Device Name	Name given to emitting process by plant	Kiln #1, Unit #2, etc.
System Type	Type of System	Onsite or Commercial Incinerator
APC System	All types of APCD in emitting process	ESP/FF/VS, QC, MC
5. APC Device Type	Type of APCD described in this sub-section	WS, SD, IWS, etc.
Design Information:		
Controls emissions from	Describes which device precedes this APCD	Controlled Air, ESP, etc.
Location	Location of current APCD within total APCD train	1, 2, 3, 4, 5
# of Devices	Number of similar APCDs in EP	
Manufacturer	APCD Manufacturer	
Configuration	Basic configuration of Scrubber	Packed Tower, Crossflow, etc.

*Numbers represent sort order for data summary.

Field Name*	Description	Example Inputs
Reagent	Type of reagent used if any	NaOH, Lime, etc.
Pack Height (ft)	Pack height in feet	
Pack Surface Area (ft2)	Pack surface area in feet squared	
Column Height (ft)	Column height in feet	
Pack Type	Pack type	
Column Diameter (ft)	Column diameter in feet	
Comment	Any additional comments regarding APCD description	
Operating Information:		
6. Run ID	Identification # for run. Consists of EP ID #/Condition #/Run #	101C1R1, 101C1R2, etc.
Temp (F)	Average temperature at APCD	
Pressure Drop (in. H2O)	Pressure drop across scrubber in inches of water	
Liquid to Gas (gal/kacf)	Liguid to gas ratio in gallons per thousand actual cubic feet	
PH	PH	
Reagent to Gas (lb/kacf)	Reagent to gas ratio in pounds per thousand cubic feed	
Section 4f. Other Control Design and Operating Information.		
1. Company	Company	
2. State	State	
3. City	City	
EPA ID	EPA Identification Number	
Region	EPA Region	
4. EP ID	Emitting process ID number. 3 digit number used by EER.	101, etc.
Device Name	Name given to emitting process by plant	Kiln #1, Unit #2, etc.
System Type	Type of System	Onsite or Commercial Incinerator
APC System	All types of APCD in emitting process	ESP/FF/VS, QC, MC
5. APC Device Type	Type of APCD described in this sub-section	C, HS, HEPA, etc.
Design Information:		
Controls emissions from	Describes which device precedes this APCD	Controlled Air, ESP, etc.

*Numbers represent sort order for data summary.

TABLE 3-1. DATA SUMMARY FIELD DESCRIPTIONS AND EXAMPLES

Field Name*	Description	Example Inputs
Location	Location of current APCD within total APCD train	1, 2, 3, 4, 5
# of Devices	Number of similar APCDs in EP	
Manufacturer	APCD Manufacturer	
Configuration	Basic configuration of control device	
Comment	Any additional comments regarding APCD description	
Operating Information:		
6. Run ID	Identification # for run. Consists of EP ID #/Condition #/Run #	101C1R1, 101C1R2, etc.
Temp (F)	Average temperature at APCD	
Pressure Drop (in. H2O)	Pressure drop across control device in inches of water	
PH	PH	
KVA	Power in KVA	
Section 5. Air Emission Stream Rates		
1. Company	Company	
2. State	State	
3. City	City	
EPA ID	EPA Identification Number	
Region	EPA Region	
4. EP ID	Emitting process ID number. 3 digit number used by EER.	101, etc.
Device Name	Name given to emitting process by plant	Kiln #1, Unit #2, etc.
System Type	Type of Kiln	Cement Kiln
APC System	All types of APCD in emitting process	ESP/FF/VS, QC, MC
5. Type	Stream type	Controlled, Uncontrolled
6. Description	Stream description	Emissions
Additional ID Information:		
Process Group	Describes combustion group with which stream is associated	Wet or Dry Kiln
Location	Measurement location	Stack, Bypass, ESP Entrance, etc.
Phase	Stream phase	Gas
Stack Information:		
Stack Height (ft)	Stack height (feet)	

*Numbers represent sort order for data summary.

TABLE 3-1. DATA SUMMARY FIELD DESCRIPTIONS AND EXAMPLES

Field Name*	Description	Example Inputs
Stack Diameter (in)	Inside stack diameter (inches)	
Stream Rates and Properties:		
7. Run ID	Identification # for run. Consists of EP ID #/Condition #/Run #	101C1R1, 101C1R2, etc.
Method	Type substance measured	Metals, SVOC, etc.
Process Rate	Flow rate of current process stream in dry standard cubic feet per minute	
Temp (F)	Temperature of current process stream (°F)	
Oxygen (%)	Oxygen content of current process stream (%vol, dry)	
Moisture (%)	Moisture content of current stream (%,wt)	
Section 6. Other Stream Rates		
1. Company	Company	
2. State	State	
3. City	City	
EPA ID	EPA Identification Number	
Region	EPA Region	
4. EP ID	Emitting process ID number. 3 digit number used by EER.	101, etc.
Device Name	Name given to emitting process by plant	Kiln #1, Unit #2, etc.
System Type	Type of System	Cement Kiln
APC System	All types of APCD in emitting process	ESP/FF/VS, QC, MC
5. Type	Stream type	FF ash, fuel, waste, spike, etc.
6. Description	Stream description	Product, Coal, CCl4 spike, etc.
Additional ID Information:		
Process Group	Describes combustion group with which stream is associated	Wet Kiln or Dry Kiln
Location	Measurement location	Primary, Secondary, ESP, FF, etc.
Phase	Stream phase	Gas, Liquid, Solid, Sludge
Feed Stream Information		
Feed Mechanism	Description of mechanism used to feed stream	Ram feed, atomizing nozzle, etc.
Feed Location	Location in device where feed is fed	Low end, high end, etc.
Manufacturer	Manufacturer of feed mechanism or burner	

*Numbers represent sort order for data summary.

Field Name*	Description	Example Inputs
Number of Burners	Number of burners	
Stream Rates and Properties:		
7. Run ID	Identification # for run. Consists of EP ID #/Condition #/Run #	101C1R1, 101C1R2, etc.
Process Rate	Flow rate of current process stream (units provided)	
Moisture (%)	Moisture content of current stream	
Heating Value	Heating value of current stream (units provided)	
Viscosity, cSt	Viscosity of current stream	
Density, lb/ft3	Density of current stream	
Ash (%)	Ash content of current stream	
Section 7. Emissions Analysis		
1. Company	Company	
2. State	State	
3. City	City	
EPA ID	EPA Identification Number	
Region	EPA Region	
4. EP ID	Emitting process ID number. 3 digit number used by EER.	101, etc.
Device Name	Name given to emitting process by plant	Kiln #1, Unit #2, etc.
System Type	Type of System	Cement Kiln
APC System	All types of APCD in emitting process	ESP/FF/VS, QC, MC
5. Type	Stream type	Controlled, Uncontrolled
6. Description	Stream description	Emissions
Process Group	Describes combustion group with which stream is associated	Wet Kiln or Dry Kiln
Location	Measurement location	Stack, Bypass, ESP Entrance, etc.
Phase	Stream phase	Gas
7. Category	Substance category	Chlorine, VOCs, Metals, etc.
Analysis:		
8. Substance	Substance name	Chlorine, Particulate, Arsenic, etc.
9. Run ID	Identification # for run. Consists of EP ID #/Condition #/Run #	101C1R1, 101C1R2, etc.
Concentration	Concentration of substance in current stream (units provided)	

*Numbers represent sort order for data summary.

Field Name*	Description	Example Inputs
Mass Rate	Mass rate of substance in current stream (units provided)	
Calc	Type of calculation performed	CE, CC, CCE, etc.
Section 8. Other Stream Analysis		
1. Company	Company	
2. State	State	
3. City	City	
EPA ID	EPA Identification Number	
Region	EPA Region	
4. EP ID	Emitting process ID number. 3 digit number used by EER.	101, etc.
Device Name	Name given to emitting process by plant	Kiln #1, Unit #2, etc.
System Type	Type of System	Cement Kiln
APC System	All types of APCD in emitting process	ESP/FF/VS, QC, MC
5. Type	Stream type	FF ash, fuel, waste, spike, etc.
6. Description	Stream description	Product, Coal, CCl4 spike, etc.
Process Group	Describes combustion group with which stream is associated	Wet Kiln or Dry Kiln
Location	Measurement location	Primary, Secondary, ESP, FF, etc.
Phase	Stream phase	Gas, Liquid, Solid, Sludge
7. Category	Substance category	Chlorine, VOCs, Metals, etc.
Analysis:		
8. Substance	Substance name	Chlorine, Lead, Arsenic, etc.
9. Run ID	Identification # for run. Consists of EP ID #/Condition #/Run #	101C1R1, 101C1R2, etc.
Concentration	Concentration of substance in current stream (units provided)	
Mass Rate	Mass rate of substance in current stream (units provided)	
Calc	Type of calculation performed	CE, CC, CCE, etc.

*Numbers represent sort order for data summary.

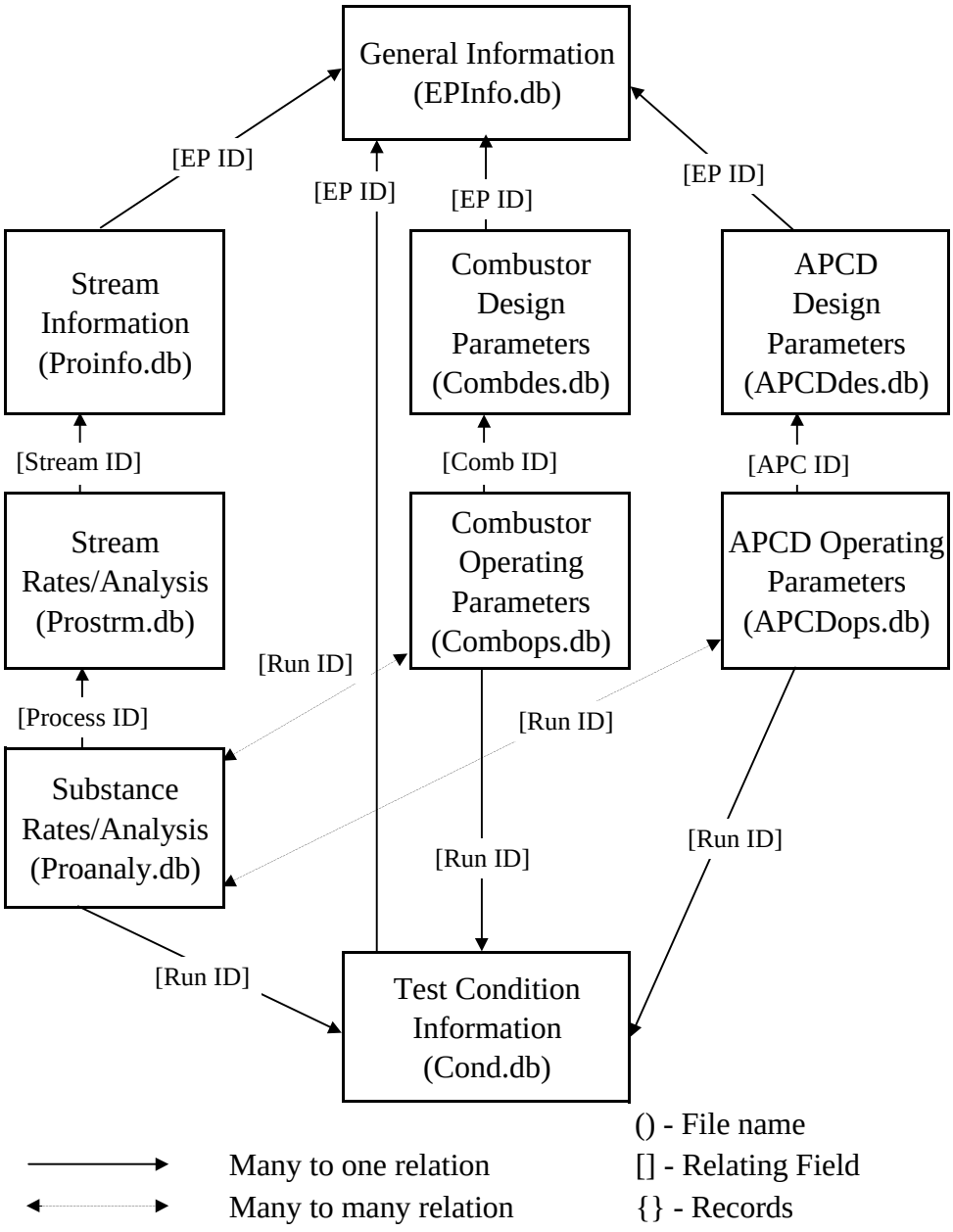

Figure 3-1. Database Structure.